AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A method for increasing the signal to noise ratio of a broadband receive wire-line system, said method comprising:

receiving receive signals from a wire-line, wherein the receive signals comprise a continuous broadband frequency spectrum;

amplifying the receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature digital versions of the received signals, wherein the in-phase and quadrature versions are about ninety degrees out of phase with respect to each other;

storing the signal-plus-noise signals in a memory device;

forming at least one matrix digitally representing a plurality of values, the values consisting of the in-phase and quadrature versions of the receive signals;

using a topographic digital number array, that covers a bipolar range and is in equilibrium about a topocentric value, to detect when the polarity of the noise portion of a signal-to-noise combination changes from positive to negative or from negative to positive in response to an injection of a predetermined value probe;

performing an iterative process on data contained in the matrix, wherein the iterative process converges to an estimate of the magnitude and polarity of a primarily noise portion of the signal-plus-noise for each trial; and,

subtracting each estimated noise value from the stored signal-plus-noise version

to obtain a noise-reduced signal,

wherein the noise-reduced signal is a broadband signal exhibiting a reduction in

the overall system noise and is obtained without the use of a transversal filter.

2. (original): A method as claimed in claim 1 further comprising:

forming left and right topological groupings of digital numbers about a topocentric

reference that corresponds to a zero voltage injection from pre-programmed and

memorized voltage value injection patterns that comprise incremental successively

increasing positive and negative steps in each of a plurality of rows, each row having

similar increments with the same topocentric zero reference.

Claim 3 (canceled).

4. (previously presented): A method as claimed in claim 1, wherein said iterative

processing comprises:

sequentially applying a series of digital values to said data to alter a value

representing signal-plus-noise and wherein several iterations produce an estimate of a

noise only portion of the signal-plus-noise by algebraically summing resultant values of

the several iterative steps.

Claim 5 (canceled).

6. (previously presented): A method as claimed in claim 4, further comprising:

providing at least one of the rows of the matrix that is reversed in a pre-

programmed manner such as to cover the column injectors from minus to plus.

7. (original): A method as claimed in claim 2, further comprising:

forming a topographical number array rendered in equilibrium, and symmetrical

about the topocentric zero reference, by shifting a row of the array corresponding to a

signal-to-noise entry that has a minimum deviation of said entry from the average of the

two or more entries, such average referenced as a first row and these two

aforementioned rows having the plus and minus increment patterns reversed with

respect to each other.

8. (original): A method as claimed in claim 1, further comprising

providing a processing means for performing said iterative processing wherein

bandwidth and signal handling capabilities of the system are not adversely

compromised and wherein a time delay of said processing means is short with respect

to said method; and

utilizing the short time delay to permit signal-to-noise to be significantly improved.

9. (previously presented): A method as claimed in claim 4, further comprising:

providing time needed to perform the iterative process thereby realizing means for achieving "near-real time" behavior of the sensing system by executing the iterations at a faster rate than the basic receipt of signal information, which corresponds to the "Nyquist" sampling rate, which is in accordance with the signal modulation characteristics, such iterative process having several iterations accomplished at a fast processing speed, wherein the iterations occur while the received samples are stored and remembered while the several iterations take place and wherein the desired relative processing speed is controlled by the division of the sampling frequency as determined by an divisor ratio, thereby achieving a prescribed known rate and a fixed tolerable time delay.

10. (previously presented): An apparatus operable to accomplish the method of claim 4 wherein sensing and control abilities of the topographical number array are needed to execute the converging iterative process, said apparatus being enabled by the delay and storage features that maintain the sign apportion of this process constant so as to render the variations that occur from one iterative to the next one to consist primarily of the noise changes.

Claims 11-20 (canceled).

21. (original): A method as claimed in claim 8, further providing a practical implementation of a non-stationery series of events that are executed in non-real time

by an iterative probe and unique bipolar sensing method that result in improving the entropy of the system.

22. (original): A method as claimed in claim 1 further comprising:

implementing a comprehensive method of realizing near-real time processing that satisfies the "second law" of thermodynamics by achieving, during a tolerable known time departure (i.e. fixed "time delay") from real time, an estimate of the noise portion of the signal plus noise of said iterative process, said estimate serving as a statistical mechanic results such that when such a quantity is subtracted, it is analogous to an introduction of energy at a lower temperature in a thermal system, thereby improving (i.e. lowering) the effective entropy of each trial.

Claims 23-25 (canceled).

26. (previously presented): A method as claimed in claim 1 wherein said method enhances the receive signal at a gateway of an individual user, such improvement consisting of a stronger signal, relative to noise, at a user end of the overall process providing a longer communication distance, quicker access time, or both a longer communication distance and quicker access time.

Claim 27 (canceled).

28. (previously presented): A method for increasing the signal to noise ratio of a receive system, said method comprising:

receiving receive signals;

amplifying the receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature digital versions of the receive signals, wherein the in-phase and quadrature versions are about ninety degrees out of phase with respect to each other;

storing the signal-plus-noise signals in a memory device;

forming a topological number array (TNA) for at least two successive trials of receive signals, wherein the TNA contains data consisting of the in-phase and quadrature versions of the receive signals;

performing an iterative process on the data contained in the TNA to determine an estimate of the magnitude and polarity of the noise portion of the signal-plus-noise for each trial, wherein the iterative process consists at least of successively adding a series of equally spaced values to the data and determining a particular value that causes the noise portion to change polarity; and

subtracting each estimated noise value from the stored signal-plus-noise version to obtain a noise-reduced signal.

29. (currently amended): A receive system comprising:

means for receiving signals across an entire wide continuous system bandwidth to provide increased system noise resulting in an increased total bandwidth to

accommodate a plurality of communication channels, and for improving the reception of pulsed signals,

means for iteratively processing data that represents the received signals which are stored in an array, and for determining an estimate of a magnitude and polarity of a noise-only portion of a signal-plus-noise version of the received signals,

wherein the iterative process consists at least of successively adding a series of values to the data and determining at least one of the values that causes the noise-only portion to change polarity.

~~wherein the means for receiving does not include a transversal filter and wherein the increased total bandwidth provides broadband noise that can be processed rapidly using rapidly changing noise samples.~~

30. (previously presented): A method as claimed in claim 4, further comprising:

selecting one of several surrogate values such that the largest signal-to-noise improvement is achieved; and

performing the estimation of the noise portion of the signal-plus-noise for each of one or more cycles of a carrier signal associated with the receive signals.

31. (previously presented): A method as claimed in claim 30, wherein the receive signals are provided in a modulated form so that a demodulated result signal is formed based on the selected probe.

32. (previously presented): A method as claimed in claim 1 further providing:

providing a time delay required such that the iterative process can be performed

substantially in real time for each cycle of a carrier signal of the receive signal, wherein

signal modulation is achieved such that the Nyquist criterion is satisfied for the

modulation.

33. (previously presented): A method as claimed in claim 32, wherein the signal

modulation comprises phase modulation.

34. (previously presented): A method as claimed in claim 32, wherein the

iterative process on each cycle is performed on samples that have been stored.

35. (currently amended): A method for increasing a signal-to-noise ratio in a

receive system comprising providing a sequence of at least two related iterative

processes, each related to a single receive signal of the receive system and a noise

sampling, the iterative processes comprising:

simultaneously receiving signals from across an entire continuous broadband

frequency spectrum, wherein reception in the continuous broadband frequency

spectrum provides an increased amount of system noise resulting in an increased total

bandwidth to accommodate a plurality of communication channels and wherein the

increased total bandwidth provides broadband noise that can be processed rapidly

using rapidly changing noise samples;

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iteratively processing data representing the receive signals and stored in an array, and determining an estimate of a magnitude and polarity of a noise-only portion of a signal-plus-noise version of the receive signals, wherein the iterative processing consists at least of successively adding a series of equally spaced values to the data and determining at least one of the equally spaced values that causes the noise-only portion to change polarity;

providing a respective series of signal level assumptions (probe values) for each of the iterative processes; and

deriving an equivalent noise level by using a digital iterative noise estimation process, wherein the noise estimates are determined by algebraically summing several iterative digital values such that a cumulative sum becomes a close approximation to the actual value of the noise, but with the polarity reversed,

wherein the use of a transversal filter is avoided.

36. (previously presented): A method as claimed in claim 35, further comprising:

determining an appropriate signal level by selecting a sample that provides a maximum signal-to-noise output, wherein a carrier signal is used to determine which signal sample corresponds to a minimum residual noise effect and wherein the value of the minimum residual noise effect corresponds to a maximum signal-to-noise result.

37. (previously presented): A method of increasing signal-to-noise in a receive system comprising:

utilizing a carrier signal to determine a plurality of noise estimates;

identifying a zero signal condition which corresponds to an optimum noise

estimate from among the plurality of noise estimates; and

avoiding the use of a transversal filter.

38. (previously presented): A method as claimed in claim 1, wherein the iterative

process is performed for each cycle of a carrier signal as determined by a carrier

frequency phasing with reference to a zero phase reference, resulting in a small

predictable delay.

39. (previously presented): A method as claimed in claim 38, wherein the noise

estimate is obtained from one complete cycle of the carrier for a pulsed signal and the

receive signal corresponds to an absence of carrier and the noise is reduced to a

residual value providing the ability to detect each pulse of the signal.

40. (previously presented): A method for increasing the signal to noise ratio of a

receive wire-line system, said method comprising:

receiving receive signals from a wire-line;

amplifying the receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature digital versions of the received signals, wherein

the in-phase and quadrature versions are about ninety degrees out of phase with

respect to each other;

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storing the signal-plus-noise signals in a memory device;

forming at least one matrix digitally representing a plurality of values, the values

consisting of the in-phase and quadrature versions of the receive signals;

performing an iterative process on data contained in the matrix to determine an

estimate of the magnitude and polarity of the noise portion of the signal-plus-noise for

each trial;

subtracting each estimated noise value from the stored signal-plus-noise version

to obtain a noise-reduced signal, wherein the noise-reduced signal is a broadband

signal exhibiting a reduction in a value of the overall system noise; and

forming left and right topological groupings of digital numbers about a topocentric

reference that corresponds to a zero voltage injection from pre-programmed and

memorized voltage value injection patterns that comprise incremental successively

increasing positive and negative steps in each of a plurality of rows, each row having

similar increments with the same topocentric zero reference.

41. (previously presented): A method as claimed in claim 40, further comprising:

forming a topographical number array rendered in equilibrium, and symmetrical

about the topocentric zero reference, by shifting a row of the array corresponding to a

signal-to-noise entry that has a minimum deviation of said entry from the average of the

two or more entries, such average referenced as a first row and these two

aforementioned rows having the plus and minus increment patterns reversed with

respect to each other.

42. (previously presented): A method for increasing the signal to noise ratio of a receive wire-line system, said method comprising:

receiving receive signals from a wire-line;

amplifying the receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature digital versions of the received signals, wherein the in-phase and quadrature versions are about ninety degrees out of phase with respect to each other;

storing the signal-plus-noise signals in a memory device;

forming at least one matrix digitally representing a plurality of values, the values consisting of the in-phase and quadrature versions of the receive signals;

performing an iterative process on data contained in the matrix to determine an estimate of the magnitude and polarity of the noise portion of the signal-plus-noise for each trial;

subtracting each estimated noise value from the stored signal-plus-noise version to obtain a noise-reduced signal, wherein the noise-reduced signal is a broadband signal exhibiting a reduction in a value of the overall system noise; and

using a topographic digital number array, that covers a positive and negative (i.e. bipolar) range and is in equilibrium about a topocentric value, to detect when the polarity of the noise portion of a signal-to-noise combination changes from positive to negative or from negative to positive in response to an injection of a predetermined value probe.

43. (previously presented): A method as claimed in claim 28 further comprising:

forming left and right topological groupings of digital numbers about a topocentric

reference that corresponds to a zero voltage injection from stored voltage value

injection patterns that comprise incremental successively increasing positive and

negative steps.

44. (previously presented): A method as claimed in claim 28 further comprising:

using a topographic digital number array, that covers a positive and negative (i.e.

bipolar) range and is in equilibrium about a topocentric value, to detect when the polarity

of the noise portion of a signal-to-noise combination changes from positive to negative

or from negative to positive.

45. (previously presented): A method as claimed in claim 28, wherein the

iterative process comprises:

sequentially applying a series of digital values to the data to alter a value

representing signal-plus-noise and wherein several iterations produce an estimate of a

noise only portion of the signal-plus-noise by algebraically summing resultant values of

the several iterations.

46. (previously presented): A receive system comprising:

a receiver operable to simultaneously receive signals from across an entire

continuous broadband frequency spectrum, wherein reception in the continuous

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broadband frequency spectrum provides an increased amount of system noise resulting

in an increased total bandwidth to accommodate a plurality of communication channels,

and for improving the reception of pulsed signals; and

an iterative processor operable to iteratively process data representing the

receive signals and stored in an array, and further operable to determine an estimate of

a magnitude and polarity of a noise-only portion of a signal-plus-noise version of the

receive signals,

wherein the increased total bandwidth provides broadband noise that can be

processed rapidly using rapidly changing noise samples, and

wherein the iterative process consists at least of successively adding a series of

equally spaced values to the data and determining at least one of the equally spaced

values that causes the noise-only portion to change polarity.

Claims 47 and 48 (canceled).

49. (previously presented): A receive system as claimed in claim 46, further

comprising a subtraction unit operable to subtract the estimated noise values from the

signal-plus-noise version to obtain a noise-reduced signal.

50. (previously presented): A method for increasing the signal to noise ratio in a

receive system, said method comprising:

receiving receive signals;

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amplifying the receive signals to form amplified signal-plus-noise signals;

storing the signal-plus-noise signals in a memory device;

forming a topological number array (TNA) for at least two successive trials of receive signals;

performing an iterative process on the data contained in the TNA to determine an estimate of the magnitude and polarity of the noise portion of the signal-plus-noise for each trial, wherein the iterative process consists at least of successively adding a series of values to the data and determining a particular value that causes the noise portion to change polarity; and

subtracting each estimated noise value from the stored signal-plus-noise version to obtain a noise-reduced signal.

51. (previously presented): A method as claimed in claim 50 wherein the use of a transversal filter is unnecessary.

52. (previously presented): A receive system comprising:

a receiver operable to simultaneously receive signals from across an entire continuous broadband frequency spectrum, wherein reception in the continuous broadband frequency spectrum provides an increased amount of system noise resulting in an increased total bandwidth to accommodate a plurality of communication channels, and for improving the reception of pulsed signals; and

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an iterative processor operable to iteratively process data that represents the

receive signals which are stored in an array, and further operable to determine an

estimate of a magnitude and polarity of a noise-only portion of a signal-plus-noise

version of the receive signals,

wherein the iterative process consists at least of successively adding a series of

values to the data and determining at least one of the values that causes the noise-only

portion to change polarity.

53. (previously presented): A system as claimed in claim 52 wherein the use of

a transversal filter is unnecessary.